

What is claimed is:

1. A high selectivity aqueous slurry composition, comprising: non-modified silica based abrasive particles in an amount of about 5 to about 50 weight percent, and an organic compound in an amount of about 0.001 to about 2.0 weight percent in an aqueous solution, wherein the silicon oxide to silicon nitride selectivity ranges from about 50 to about 700.

2. The high selectivity aqueous slurry composition of Claim 1, wherein the non-modified silica based abrasive particles are selected from the group consisting of colloidal silica, fumed silica, precipitated silica particles, and powder milled silicon dioxide.

3. The high selectivity aqueous slurry composition of Claim 1, wherein the non-modified abrasive particles colloidal and have an average particle size of about 10-200nm.

4. The high selectivity aqueous slurry composition of Claim 1, wherein the organic compound is a high selectivity enhancing compound selected from the family of sulfates of alcohol, sulfonic acid and their salts, sulfuric acid ether salts and mixtures thereof.

5. The high selectivity aqueous slurry composition of Claim 4, wherein the organic compound from the family of sulfonic acid salts is selected from the group consisting of alkyl benzene sulfonic acids,

sulfonates of dodecyl- and tridecylbenzenes, sulfonates of naphthalene, and sulfonates of alkyl naphthalene.

6. The high selectivity aqueous slurry composition of Claim 4, wherein the organic compound from the family of alcohol sulfates of ammonium, sodium, potassium, magnesium and calcium selected from the group consisting of lauryl sulfates, decylsulfates, octylsulfates, ethylhexylsulfates, ethylhexylsulfates, alkylsulfates of amines.

7. The high selectivity aqueous slurry composition of Claim 1, wherein the organic compound from the family of sulfuric acid ether salts is selected from the group consisting of higher alcohol ether sulfates of ammonium, higher alcohol ether sulfates of sodium, and alkyl phenol ether sulfates.

8. The high selectivity aqueous slurry composition of Claim 1, wherein the organic compound is present in an amount of about 0.05 to about 1.5 weight percent.

9. The high selectivity aqueous slurry composition of Claim 1, further comprising pH adjusting compounds, pH buffers, surface active agents and viscosity modifiers.

10. The high selectivity aqueous slurry composition of Claim 1, having a pH in the range of about 1.5 to about 8.

11. A method of chemical mechanical polishing/planarization (CMP) of a semiconductor composite device, comprising:

applying a high selectivity slurry at a polishing interface between a polishing pad and the composite device, the composite device including silicon oxide and silicon nitride, and the high selectivity slurry comprising non-modified silica based abrasive particles in an amount of about 5 to about 50 weight percent, and an organic compound in an amount of about 0.001 to about 2.0 weight percent in an aqueous solution, and

selectively polishing silicon oxide in preference to silicon nitride at a selectivity ranging from about 50 to about 700.

12. The CMP method in accordance with Claim 11, wherein the organic compound is a high selectivity enhancing compound selected from the family of sulfonic acid and their salts, sulfuric acid ester salts, sulfates of alcohol and mixtures thereof.

13. The CMP method in accordance with Claim 11, wherein the organic compound is present in an amount of about 0.05 to about 1.5 weight percent.

14. The CMP method in accordance with Claim 9, wherein the non-modified silica based abrasive particles are selected from the groups consisting of colloidal silica, fumed silica, precipitated silica particles and powder milled silicon dioxide.

15. The CMP method in accordance with Claim 11, wherein the silica based abrasive particles have an average particle size of about 10-200nm.

16. The CMP method in accordance with Claim 11, wherein the high selectivity slurry comprising pH adjusting compounds, pH buffers, surface active agents and viscosity modifiers.

17. The CMP method in accordance with Claim 11, wherein the high selectivity slurry includes surface active agents regulating the surface tension of the slurry.

18. The CMP method in accordance with Claim 11, wherein the high selectivity slurry has a pH in the range of about 1.5 to about 8.

19. A method for polishing/planarizing a shallow trench isolation structure, comprising the steps of: providing a high selectivity slurry comprising non-modified abrasive particles in an amount of about 5 to about 50 weight percent, and an organic compound in an amount of about 0.001 to about 2.0 weight percent in an aqueous medium;

applying the high selectivity slurry at a polishing/planarizing interface between a polishing pad and a device comprised of silicon oxide and silicon nitride; and

selectively polishing silicon oxide in preference to silicon nitride at selectivity ratio ranging from about 50 to about 700.

20. A method of making a high selectivity aqueous slurry composition, comprising: providing non-modified silica based abrasive particles in an amount of about 5 to about 50 weight percent, and an organic compound in an amount of about 0.001 to about 2.0 weight percent in an aqueous solution, wherein the silicon oxide to silicon nitride selectivity ranges from about 50 to about 700.

21. The method of making the slurry composition of claim 20, further comprising:  
adding a pH adjusting compounds, pH buffers, surface active agents and viscosity modifiers.

22. The method of making the slurry composition of claim 20, wherein the organic compound is a high selectivity enhancing compound selected from the family of sulfonic acid and their salts, sulfates of alcohol, sulfuric acid ether salts and mixtures thereof.